

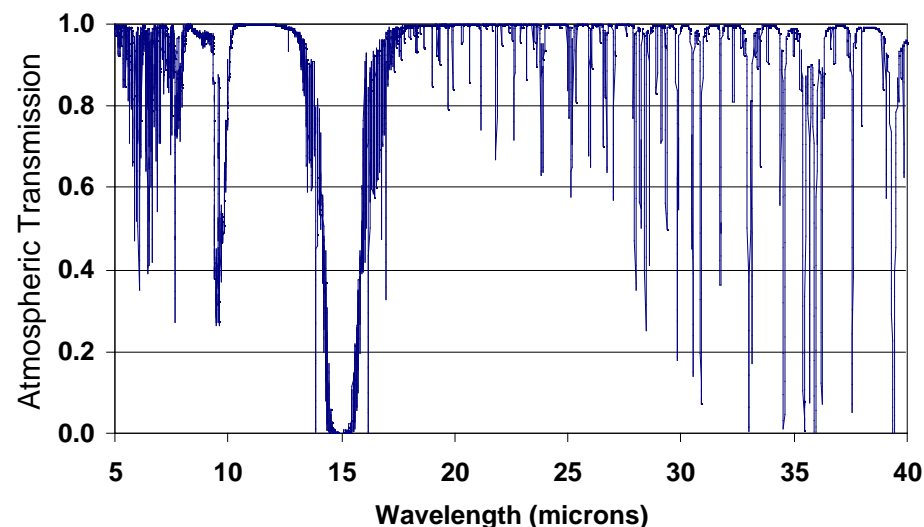
FORCAST Spectral Passbands

SOFIA

Wavelength range: 5 - 40 μm . FORCAST has two arrays (Si:As for ~ 5 - 25 μm , and Si:Sb for ~ 25 - 40 μm) that can be used to simultaneously observe the same FOV.

Top right: An ATRAN model of the atmospheric absorption as a function of wavelength in the FORCAST band (assuming zenith angle 45° and 7 μm of precipitable H_2O).

Bottom right: Filters include COTS line and continuum, and interference filters. Representative filter profiles are plotted.

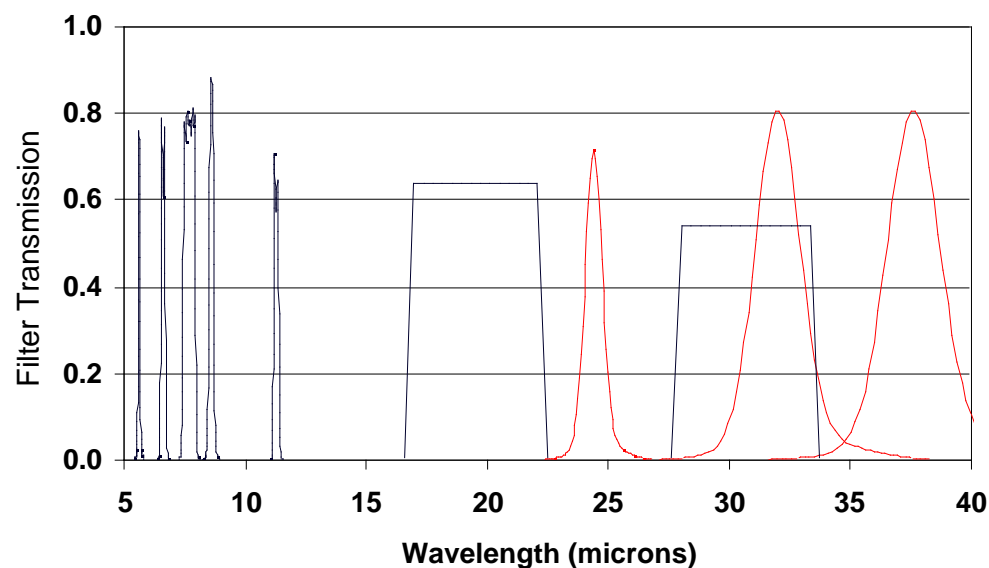


Short wavelength filters (as of 12/01):

5.61 μm (R=70)	7.69 μm (R=15)
6.61 μm (R=34)	8.61 μm (R=42)
Cont. (R=34)	11.28 μm (R=56)
18.7 μm (R=15)	18.7 μm (R=15)
21.0 μm (R=15)	24.4 μm (R=30)

Long wavelength filters (as of 10/01):

32.0 μm (R=15)	cont. (R=800)
33.4 μm (R=30)	33.4 μm (R=800)
34.8 μm (R=30)	34.8 μm (R=800)
> 36 μm (R=10)	37.6 μm (R=15)





FORCAST Sensitivity

SOFIA

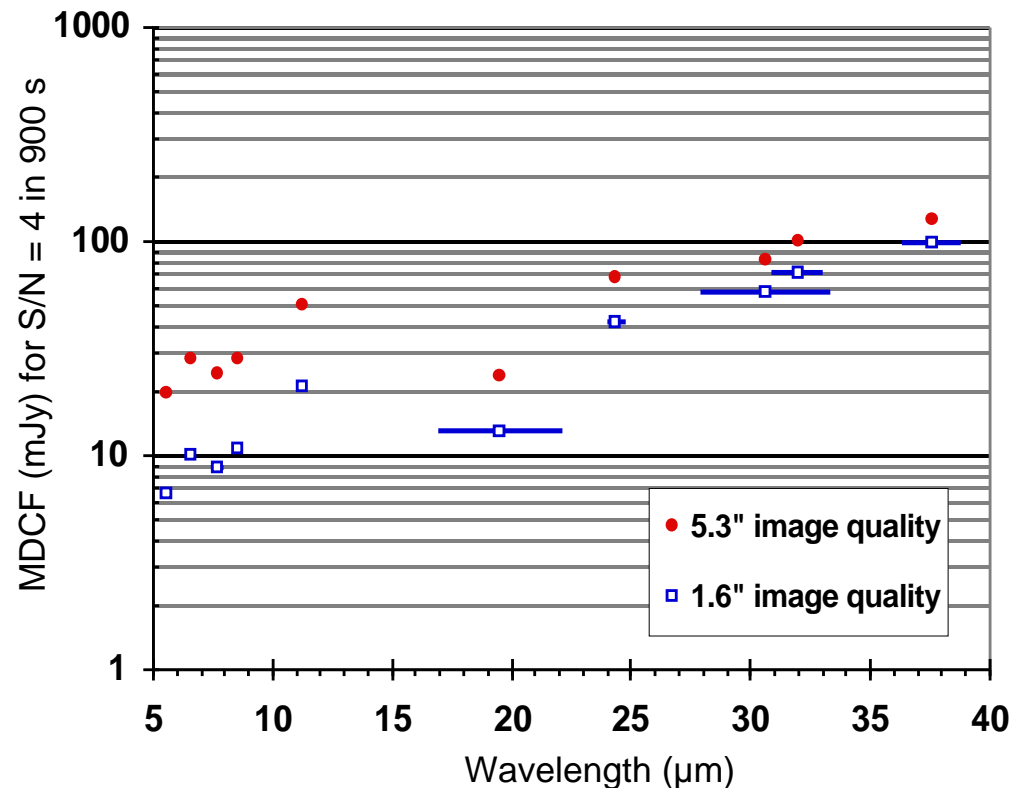
Sensitivity is shown for a continuum point source, at the effective wavelengths of ten of the filters listed on page one. The Minimum Detectable Continuum Flux (MDCF) in mJy needed to get $S/N = 4$ in 900 seconds is plotted versus wavelength.

The red dots correspond to the expected SOFIA image quality at first light: 5.3 arc-sec (80% enclosed energy); the blue dots correspond to final SOFIA image quality: 1.6 arc-sec (80% enclosed energy).

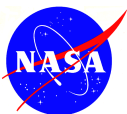
MDCF scales roughly as $(S/N) / \sqrt{t}$
where t = net integration time

Calibration and setup overhead is roughly 10%. If telescope nodding is used during observations, this may also increase total observing time needed by 5% to 10%.

Atmospheric transmission will affect sensitivity, depending on water vapor overburden.



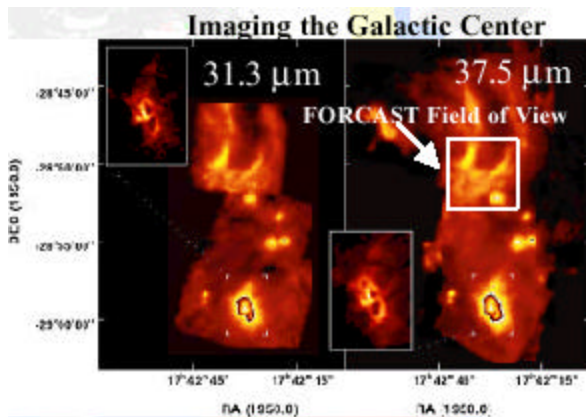
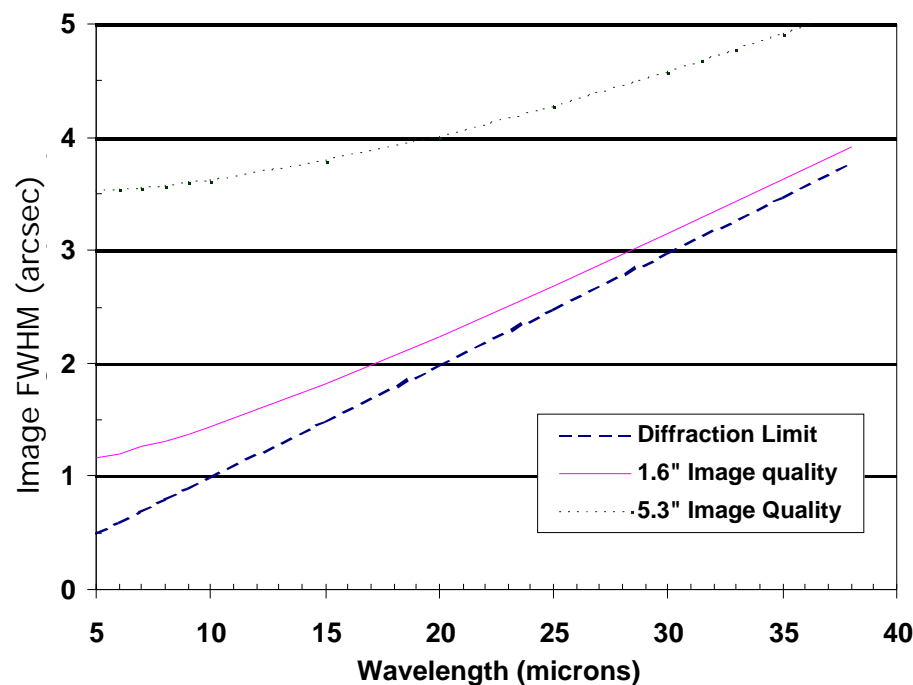
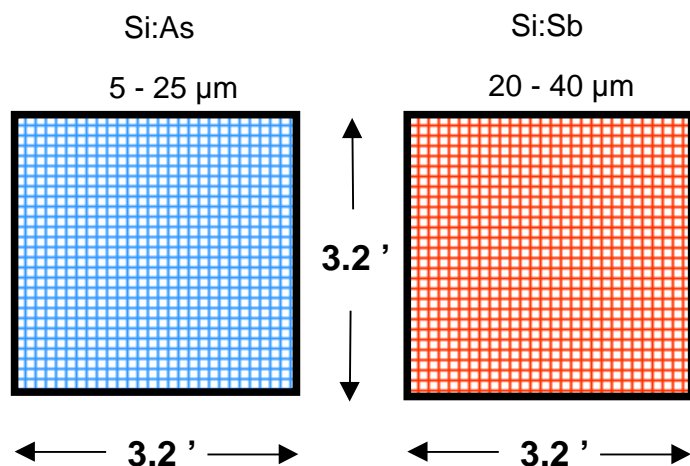
Sensitivity is also affected by telescope emissivity. Values plotted above are for telescope emissivity = 15%. At telescope emissivity = 5%, sensitivity would be 20% to 60% better (fainter).



FORCAST Angular Resolution

SOFIA

FORCAST field of view is 3.2 arcminutes square (256 x 256 pixels). Imaging scale is 0.75 arcseconds per pixel. The camera optics are diffraction limited longward of $\approx 15 \mu\text{m}$.



FORCAST angular resolution (FWHM, arc-seconds) versus wavelength for different observatory performance specs. The two image quality values are 80% enclosed energy diameters.